THE ACID FERMENTATION OF RAW SUGAR CRYSTALS.

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During the storage of raw sugar crystals in bags, an acid fermentation occasionally sets in. The sugar becomes decidedly warm to the hand, and a strongly acid odour, suggestive of a mixture of acetic and butyric acids, is evolved.

Two samples of sugar undergoing this fermentation were investigated for microscopic fungi after the manner already described in the preceding paper. The first sample, which had an acidity to phenolphthalein equivalent to 0·36 % lactic acid, contained both kinds of *Bac. levaniformans*, the gum bacillus, and no other bacteria, yeasts or moulds. The second sample had an acidity equivalent to 0·31 % lactic acid, and contained the derived type of *Bac. levaniformans* in pure culture.

From the presence of this bacillus in the sugar, it cannot be doubted that it is alone responsible for the acid fermentation. It has been already shown that the acids secreted during the growth of the organism consist of capric, carbonic, lactic, butyric, acetic and formic. The odour of the sugar is suggestive of butyric and acetic acids, but formic acid might easily be contained among the volatile acids. The latter is readily detectable by mercuric chloride, and in order to test if it were present, about 25 grms. of sugar were acidified with dilute sulphuric acid and distilled. On heating the distillate with mercuric chloride, a white precipitate of calomel was obtained. This test is sufficient to indicate formic acid, and the presence of this acid, which is one of the byproducts of the gum bacillus, confirms the fact that this organism is the cause of the acid fermentation.